TITLE OF THE INVENTION

CAD SYSTEM UTILIZING NETWORK

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a CAD system utilizing a network for transmitting CAD graphic data from a server computer connected to a network such as Internet to a client computer.

Description of the Prior Art

In a general CAD system, graphic data for displaying a variety of parts is provided in advance. However, in the case of a CAD system for machine design, a plenty of parts type is handled. In addition, even for the same parts, a plurality of graphic data such as frontal view or side view are required. Therefore, if graphic data on a variety of parts is stored in individual computers, a recording device having a tremendous amount of capacity is required, and an increase in cost is unavoidable.

In addition, in the case where new parts are registered or graphic data on the existing parts is updated, a plurality of graphic data must be added and modified for one part.

In recent years, services of providing a variety of information or data via Internet are becoming more popular, and a CAD system utilizing Internet is considered.

For example, a system in which CAD graphic data is stored in advance on a server side connected to Internet, and upon a request from a user side, graphic data is provided from a server side to the user side via Internet is feasible.

In the case of such a CAD system, although there is an advantage that there is no need for storing CAD parts data on the user side, it is required to store in advance various types of parts data corresponding to various parts on the server side.

In addition, in the case where machine design is made, parts having identical shape and different dimensions are occasionally used, but it is almost impossible to store all data on parts having different dimensions individually on the server side from the viewpoint of data capacity.

In addition, if a type of CAD software which the user uses is different from another, a data format of graphic data is generally different from another. Thus, it is required to reserve graphic data by each data format, and a recording device having a tremendous amount of capacity is required.

Further, in the case where new parts are added or graphic data is updated on the server side, a number of graphic data must be changed simultaneously, and data management is cumbersome and costly.

SUMMARY OF THE INVENTION

The present invention has been made in view of such

circumferences. It is an object of the present invention to provide a CAD system utilizing a network where it is unnecessary to prepare graphic data in advance and which can speedily provide the user desired graphic data in accordance with simplified procedure.

In order to solve the aforementioned problems, according to the Claim 1 of the present invention, there is provided a CAD system utilizing a network comprising: a server computer connected to a network; and at least one client computer performing data transmission to said server computer via the network, wherein base data of graphic data for CAD is transmitted from the server computer to the client computer according to a request from the client computer, the server computer comprising: storage means for storing base data of the graphic data; and a program data transmitting section for reading the base data of said graphic data from the storage means according to the request from the client computer and transmit the data to said client computer, the client computer comprising: a program data receiving section for receiving base data of the graphic data; a computing section for producing graphic data based on the base data of the graphic data; and a CAD graphic data producing section for preparing display data capable of being displayed on a graphic display unit in the client computer.

Further, there is provided an CAD system utilizing a network, wherein the data of the graphic data comprises a

plurality of variable programs for drawing different graphics, respectively, and real data to be substituted for each variable in the variable programs, the server computer comprises a variable program storage section for storing the plurality of variable programs; and a read data storage section for storing a plurality of the real data, the program data transmitting section reads a predetermined variable program from the variable program storage section according to a request from the client computer, and reads predetermined real data from the real data storage section, and a computing section of the client computer substitutes the predetermined real data for each variable in said predetermined variable program, and executes the program, thereby producing graphic data.

Further, there is provided a CAD system utilizing a network, wherein the client computer comprises a graphic name list display control section for displaying on a display unit a list of graphic names; the control section being capable of receiving the provision of base data of graphic data from the server computer; and a selected graphic name transmitting section for transmitting to the server computer a name of a graphic selected from a list of the graphic names, the program data transmitting section in the server computer reads the predetermined variable program and the predetermined real data based on the name of the graphic transmitted from the selected graphic name transmitting section.

Further, there is provided a CAD system utilizing a network, wherein the server computer comprises a parts data list storage section for storing a group of parts code number and the real data corresponding to each code number for a respective one of parts enabling graphic display, the program data transmitting section transmits to the client computer parts data list containing a code number and real data according to a request from the client computer, the client computer comprises a code number list display control section for producing a parts code number list from the transmitted parts data list, thereby displaying the list on the graphic display unit, the computing section substitutes real data on parts corresponding a name of parts code number selected from the displayed parts code number list for each variable in the variable program corresponding to the name of the graphic, thereby producing graphic data.

Further, there is provided a CAD system utilizing a network wherein, in the case where part or whole of the real data corresponding to parts code number selected from the parts code number list in the client computer is input data inputted from a user, the computing section in the client computer substitutes the read data read from the parts data list storage section and the input data for each variable in the corresponding variable program, thereby producing graphic data.

Further, there is provided a CAD system utilizing a

network, wherein the client computer has a data format name selection function capable of selecting a data format name of CAD software, and the CAD graphic data producing section converts a format of the graphic data produced by the computing section, and the CAD graphic data of the selected data format is produced.

Further, there is provided a CAD system utilizing a network, comprising a parts database management program for managing parts data in the program data transmitting section in the server computer, wherein parts data is searched according to a request from the client computer, and can be transmitted to the client computer.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram depicting a schematic configuration of a CAD system utilizing a network according to the present invention;

FIG. 2 is a flowchart showing processing operations of the CAD system utilizing the network shown in FIG. 1;

FIG. 3 is a flowchart continued from FIG. 2;

FIG. 4 is a flowchart continued from FIG. 3;

FIG. 5 is a view showing a screen display example displayed on a graphic display unit of a client computer, wherein reference numeral 1 denotes a server computer and;

FIG. 6 is a block diagram showing a program data

transmitting section of another embodiment; reference numeral 2 denotes a client computer; reference numeral 3 denotes Internet; reference numerals 11 and 21 each denote a data input/output interface; reference numerals 12 and 12' each denote a program data transmitting section; reference numeral 13 denotes a real data storage section; reference numeral 14 denotes a variable program storage section; reference numeral 15 denotes parts data list storage section; reference numeral 22 denotes a graphic name list display control section; reference numeral 23 denotes a selected graphic name transmitting section; reference numeral 24 denotes a parts code number list display control section; reference numeral 25 denotes a program data receiving section; reference numeral 26 denotes a CAD graphic data producing section; reference numeral 28 denotes a graphic display unit; and reference numerals W1 to W8 each denote a display region.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, a CAD system utilizing a network according to the present invention (hereinafter, referred to as a "CAD system") will be specifically described with reference to the accompanying drawings. The CAD system described hereinafter is characterized in that the server side merely transmits real data and a variable program which is a basis of graphics, and

all of the graphic data producing operation and CAD format converting operation are performed by an automatically installed program on the client side.

FIG. 1 is a block diagram depicting a schematic configuration of a CAD system according to the present invention. As shown in the figure, a server computer 1 and a client computer 2 are connected to each other via an Internet 3.

The server computer 1 comprises a data input/output interface 11, a program data transmitting section 12, a real data storage section 13, a variable program storage section 14, and a parts data list storage section 15. The real data storage section 13 and the variable program storage section 14 are storage means.

The data input/output interface 11 performs data input/output relay.

The program data transmitting section 12 reads a predetermined variable program from the variable program storage section 14 according to a request from the client computer 2; reads predetermined real data from the real data storage section 13; and transmits these read variable program and real data to the client computer.

The variable program and real data is base data of graphic data, and text data. Thus, the transmission time from the server computer 1 to the client computer 1 is very short.

The real data storage section 13 stores plural types of

real data to be substituted for each variable in a variable program. The variable program storage section 14 stores a plurality of variable programs for drawing different graphics, respectively. The parts data list storage section 15 stores a parts data list (including real data) containing parts code number and real data in place of the real data storage section 13.

The client computer 2 comprises a data input/output interface 21, a graphic name list display control section 22, a selected graphic name transmitting section 23, a parts code number list display control section 24, a program data receiving section 25, a computing section 26, a CAD graphic data producing section 27, and a graphic display unit 28.

The data input/output interface 21 performs data input/output relay. The graphic name list display control section 22 displays on the graphic display unit 28 a list of graphic names capable of receiving provision of graphic data from the server computer 1.

The selected graphic name transmitting section 23 transmits to the server computer 1 a name of a graphic selected from a list of graphic names. The parts code number list display control section 24 displays on the graphic display unit 28 a parts code number list capable of receiving provision of base data of graphic data from the server computer 1.

The program data receiving section 25 receives a variable

program and real data from the server computer 1. The computing section 26 substitutes predetermined variable data for each variable in a predetermined variable program, executes the program, and produces graphic data.

The CAD graphic data producing section 27 produces display data capable of being displayed by the graphic display unit 28 based on the graphic data produced by the computing section 26. The graphic display unit 28 performs graphic display based on the display data produced by the CAD graphic data producing section 27.

FIG. 2 to FIG. 4 are flowcharts showing processing operations of the CAD system shown in FIG. 1. Hereinafter, an operation of the CAD system of the present embodiment will be described on the basis of the flowcharts.

First, as shown in FIG. 2 (step S1), the client computer 2 provides access to the server computer 1 via the internet 3. The data input/output interface 11 calls and initiates a parts database management program (step S2).

A graphic data management list is displayed on the display screen of the client computer 2 as shown in (step S3). This list shows a list of parts that can be selected on the client side, and the user can select an arbitrary part from the list by mouse operation or the like.

Next, as shown in (step S4), it is judged whether or not the user select a graphic name from the graphic data management

list by mouse operation or the like. In the case where the user selects the name of the graphic, the processing goes to (step S5) in which the selected graphic name is transmitted to the server computer 1. The server computer 1 receives the selected graphic name (step S6).

The parts database management program initiated in (step S2) reads from the parts data list storage section 15 a parts data list corresponding to the user selected graphic name, and then, transmits the list to the client computer 2 via the data input/output interface 11 (step S7).

In addition, the server computer 1, as shown in (step S8), reads from the variable program storage section 14 a variable program corresponding to the selected graphic name, and transmits the program to the client computer 2 via the data input/output interface 11 (step S8).

When the client computer 2 receives the parts data list, it produces a parts code number list from the parts data list (step S9), and displays the produced parts code number list using browse or the like (step S10).

Next, the client computer 2 judges whether or not the user select any code number from among the parts code number list using the mouse or the like (step S17). When the user selects a code number, the computer judges whether or not the user inputs variable data corresponding to the selected code number (step S12 in FIG. 3).

In the case where the user inputs variable data, the input data is added to real data (step S13). Next, real data is substituted for each variable in a variable program, the variable program is executed, and graphic data is produced (step S14). Further, display data is produced from the produced graphic data (step S15).

The display data is created in a data format that can be processed by a general-purpose OS (Operating System) such as Windows or UNIX, for example, GIF file, DWF file, JPG file. Then, the client computer 2, as shown in FIG. 4 (step S16), perform displaying based on the produced display data. Alternatively, graphic data may be directly drawn on the graphic display unit with a program using C language, basic language or the like without producing the display data.

Next, the client computer 2, as shown in (step S17), prompts the user to confirm whether or not a graphic displayed on the graphic display unit 28 is what he or she want. Otherwise, the processing returns to (step S4) in FIG. 2, parts selection is retried. When the graphic is what he or she wants, as shown in (step S18), the computer causes the user to select a CAD drawing data format.

A reason why this processing is provided is that the CAD software data format is not unified. In (step S18), the computer causes the user to select a data format corresponding to the user's CAD software such as DXF file, DWG file, IGES file,

or BMI file.

Next, the client computer 2 reads a format conversion program corresponding to the user selected data format, and initiates the read program (step S19).

The format conversion program, as shown in (step S20), the graphic data produced in (step S14) is converted into the user selected data format, a new file name is assigned, and the data is stored in a recording device. Thereafter, the produced CAD graphic data is displayed on the CAD screen according to the user's instruction.

The foregoing processing operations shown in the flowcharts of FIG. 2 to FIG. 4 are summarized as follows. In (steps S1 to S8), when the user selects parts, the server computer 1 transmits to the client computer 2 variable program and real data (parts data list) which is base data of the graphic data corresponding to the parts.

Next, in (steps S9 to S17), real data corresponding to the user selected code number is substituted for each variable in the program file corresponding to the user selected part to perform arithmetical operation. Based on the arithmetical operation result, graphic data is produced, and the display data is produced to be displayed on the display unit of the client computer 2.

Next, in (step S18 to S20), graphic data is converted into a data format specified by the computer 2, and is stored after

a file name has been assigned.

Thus, in the illustrative embodiment, the server side merely transmits real data which is a basis of graphics; and a variable program, whereby all operations such as graphic data production and CAD format conversion are performed by an automatically installed program on the client side. Thus, there is no need for reserving graphic data in the server computer 1 or client computer 2.

In addition, the variable program and real data from the server computer 1 is text data, and thus, the transmission time from the server computer 1 to the client computer can be reduced significantly.

The user merely selects desired parts from the parts list displayed on the screen, thereby making it possible to acquire graphic data corresponding to the parts. In addition, the user can input variable data such as parts dimensional value in advance, making it possible to obtain graphic data on special parts in accordance with a simplified procedure. Further, the client computer 2 substitutes variable data for each variable in the variable program, thereby producing graphic data. Thus, graphic data having different dimensions can be easily produced, and graphic data with its high precision and high reliability can be provided.

Further, the user can utilize base data of the graphic data downloaded on the client computer 2, and thus, can construct

a unique database with its very low cost. Constructing such database enables reuse or modification of the base data of the downloaded graphic data, and usable and economical database is obtained.

FIG. 5 is a view showing an screen display example displayed on the graphic display unit 28 of the client computer 2. The screen of FIG. 5 shows an example when a part having a hierarchical structure is selected and displayed. In a display region W1 of the screen inside, display data produced by the processing in (step S15) is displayed.

Here, in the display region W1, there is shown a display example of a hexagonal bolt. A final name of parts of this hexagonal bolt is a hexagonal bolt + SW (which means Spring Washer), for example. A variable program for displaying a graphic corresponding that name is of one type (because the shape is identical). However, for variable data, there are 32 types of data whose sizes are difference from M3 to M80. These types of data are arranged so as to be selected from among the code number list produced from the parts data list (including real data).

A page,column is displayed in a display region W2; a first parts list for parts selection of the first hierarchy is displayed in a display region W3; in a display region W4 a second parts list for parts selection of the second hierarchy is displayed for parts selected in the first parts list; and in

a display region W5 a third parts list for parts selection of the third hierarchy of these first to third parts lists is displayed for parts selected in the second parts list. Parts selections of these first to third parts lists correspond to the processing operations of (step S4) shown in FIG. 2. After the server computer has sent a parts data list corresponding to the graphic name selected from the third parts list, a code number list is produced, and is displayed in a display region W6. This corresponds to the processing operations from (step S7) to (step S10).

In addition, an input box for dimensions corresponding to selected parts is displayed in a display region W7 in the screen of FIG. 5, and a specification data selection list is displayed in the lower display region W8.

As shown in FIG. 5, the user select parts in accordance with a menu displayed on the screen of the client computer 2, thereby making it possible to obtain graphic data corresponding to desired parts simply and speedily.

In the aforementioned illustrative embodiment, although an example of producing two-dimensional graphic data has been described, a variable program file or real data is changed, thereby making it possible to produce three-dimensional graphic data.

In addition, in the aforementioned illustrative embodiment, although an example of producing graphic data on

mechanical parts has been described, the present invention is applicable similarly in the case where graphic data on electrical parts such as transistor or diode; or graphic data for architectural members is produced.

Further, in the aforementioned illustrative embodiment, although an example when the server computer 1 and the client computer 2 are connected with each other via the Internet 3, the present invention is applicable in the case where the server computer 1 and the client computer 2 are connected to various networks other than the Internet 3.

In addition, as shown in FIG. 6, the CAD system can comprise a parts database management program for parts data in a program data transmitting section 12' in the server computer. In such case, parts data can be searched according to a request from the client computer 2.

As has been described above in detail, according to the present invention, the server side merely transmits real data which is a base of graphics; and a variable program, whereby all operations such as graphic data production or CAD format conversion are performed by an automatically installed program on the client side. Thus, there is no need for reserving graphic data in the server computer or client computer.

In this manner, the entire system cost can be reduced. In addition, only the data which is a base of multiple types of graphic data is transmitted, and thus, the data download time

can be reduced significantly. Arbitrary graphic data which each of the users wants can be provided to a number of users via a network, and thus, a CAD system with its high usability and excellent performance can be provided.

In addition, when the user inputs variable data such as dimensional value, graphic data is produced in consideration of the input data. Thus, graphic data with high precision and high reliability can be provided in accordance with the simplified procedure.

Further, real data or a variable program is updated, whereby graphic data on new parts can be provided to a number of users speedily.